

1 **Psychosocial Factors in Sports Injury Rehabilitation and Return to Play**

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Synopsis

The goal of this review is to provide insight into the principles and practices that guide psychological intervention with injury and in so doing cultivate a psychologically minded approach to injury for the medical provider. The chapter is divided into two parts. Part 1 provides an overview of the research literature, which serves as a foundation for the brief review of clinical practices that follow in Part 2. Examination of the research literature will highlight four areas including: (1) psychological factors influencing rehabilitation, (2) social factors impacting rehabilitation (3) performance concerns among returning athletes, and (4) tools/inventories for assessing psychological readiness to return. The section on clinical practices highlights the Affective Cycle of Injury as a model for clinical intervention and the Sports Medicine Injury Checklist as a practical guide for assessment and triage. Finally, a brief synopsis of an injury intervention plan is provided, and the influence of pain and fear in the rehabilitation process is described.

Part 1 – The Research Literature

Psychological factors impact on rehabilitation.

Research on psychological factors has found that cognitive appraisals, emotional reactions, and behavioral responses to injury influence the quality and nature of athletes' rehabilitation. Cognitive, emotional and behavioral factors influencing athletes' rehabilitation are discussed separately.

Cognitions. A range of cognitions have been identified which influence athletes' emotions and behaviors in rehabilitation settings including: attributions for injury occurrence, self-perceptions following injury, cognitively based coping strategies and perceived injury benefits. Self-perceptions of esteem and worth have also been shown to diminish following injury in some studies (e.g., Leddy, Lambert & Ogles, 1994)¹ but not in others (e.g., Smith, Stuart, Wiese-Bjornstal, Milliner, O'Fallon, & Crowson, 1993).² Cognitive appraisals of the potential benefits of injury have been described including: opportunities to develop non-sport interests, viewing injury as a test of character, enhanced appreciation for sport, greater resilience, and enhanced knowledge of the body and technical mastery.^{3,4} Quinn and Fallon (1999)⁵ found differences in sport self-confidence over the course of rehabilitation, with confidence levels high at the onset of injury, declining during rehabilitation, and increasing with recovery. Unfortunately, there is little other study of change in appraisal over time and how this is related to recovery.

Emotions. Athletes' emotional reactions to injury have been found to include feelings of loss, denial, frustration, anger, and depression (e.g., Tracey, 2003).⁶ Positive emotions such as happiness, relief and excitement

have been reported as well.⁷ The attainment of rehabilitation goals and the prospect of recovery may engender a host of positive emotional responses throughout the course of rehabilitation. It appears these responses are influenced by a wide array of personal (e.g., athletic identity, previous injury experience, injury severity, injury type, current injury status) and situational factors (e.g., life stress, social support satisfaction, timing of the injury).^{2, 8-16}

It has been shown that emotions typically fluctuate in response to rehabilitation progress and/or setbacks (see Brewer, 2007 for a review).¹⁷ Typically emotional states move from negative to positive as athletes' progress through their rehabilitation and a return to competition draws nearer. Interestingly, studies have shown an increase in negative affect as the return to sport approaches, owing possibly to anxieties over reinjury, the uncertainty of what lies ahead, as well as concerns that post-injury goals may be unrealized.¹⁸ Alternatively, return to sport may be viewed as a functional reality check challenging denial that may have falsely bolstered athlete expectation. In summary, individual differences in emotional response over the course of rehabilitation are varied, complex, and fluctuate in accord with rehabilitation progress and setbacks.

Behaviors. The extent to which athletes employ various coping skills (e.g., goal setting, imagery, seeking out social support) and adhere to rehabilitation have received the greatest amount of research attention. Personal factors linked to adherence including pain tolerance,¹⁹ self-motivation,²⁰ tough-mindedness,²¹ perceived injury severity,²² internal health locus of control,²³ self-efficacy,^{24, 25} and self-esteem²⁶ have all been positively associated with rehabilitation adherence, while mood disturbance⁹ and fear of reinjury²⁷ are negatively associated.

Adherence has been positively associated with enhanced clinical outcomes such as proprioception, range of motion, joint/ligament stability, muscular strength and endurance as well as reductions in the subsequent risk of re-injury.^{9, 17, 28-30} However, non-significant³¹ and negative relationships^{30, 31} have also been found. The negative relationship in particular is likely a function of methodological problems. While it is a simple matter to get measures of compliance such as attendance, assessing the more subtle elements such as motivation and psychological coping behaviors is much more difficult. In fact, active coping responses such as use of positive self-talk,³² imagery,²⁴ goal-setting,³³ and seeking out additional information about injury³⁴ are also associated with adherence. In addition, situational factors, mostly related to perception of treatment, also predict adherence, including: a belief in the efficacy of the treatment;³⁵ information about rehabilitation;³⁶ the clinical environment;³⁶ value of rehabilitation to the athlete,²² and hours a week of sport involvement.³⁷

Psychological interventions that have demonstrated efficacy in enhancing the rate or quality of sport injury rehabilitation include: goal setting,³³ imagery and relaxation,³⁸ and stress inoculation.³⁹ Similarly, the use of self-directed cognitive coping strategies predict favorable psychosocial outcomes such as accepting injury, focusing on getting better, thinking positive and using imagery.¹⁰ There is also speculation that psychological factors may expedite the recovery process through neurochemical or physiological changes such as increased blood flow, enhanced proprioception, muscular endurance and strength and coordination. Empirical support for such contentions however, is lacking.⁴⁰

Social Factors Impacting Injury Rehabilitation.

The two most influential social factors influencing athletes' injury rehabilitation are the nature of patient-practitioner interactions and the effectiveness of social support provisions.

Patient-practitioner interactions. Patient-practitioner interactions, mainly those between the athlete and athletic trainer/sport physiotherapist, have been found to be crucial factors influencing athletes' psychological state, the quality of their rehabilitation experiences, and eventual treatment outcomes.⁴¹ Given the close proximity and regularity of contact, sport medicine professionals are uniquely positioned to play an influential role in the psychological well-being of injured athletes through behavioral intervention as well as through effective psychological triage and referral.^{42, 43} Positive behaviors exhibited by rehabilitation specialists include: building patient alliances based on acceptance, genuineness, and empathy;⁴⁴ effective communication;⁴⁵ counseling;⁴⁶ and the provision of social support (discussed in greater detail below).⁴⁰ The delineation of athletes' role (e.g., motivation, compliance, communication of concerns) and the establishment of clear expectations also appear crucial in optimizing athletes' rehabilitation motivation and adherence.⁴⁷ Practitioners may also facilitate rehabilitation by clarifying their own role in the treatment process, specifically, providing clear information about treatment, adequate pain control, and participation in key decisions.⁴⁸

Social support. A wealth of evidence highlights the benefit of social support in coping with difficult life events and facilitating rehabilitation from a variety of ailments (e.g., cardiac rehabilitation).⁴⁹ The value of social support in a sport injury context is no exception. Social support and assistance from a variety of sources including sport medicine practitioners, coaches, teammates and family may be vital in enhancing injured athletes' resilience and facilitating adaptive coping (e.g., Bianco & Eklund, 2001).⁴⁰ The athlete may benefit from support expressed by listening to the athlete, acknowledging advances in rehabilitation progress (e.g., greater range of motion),

providing emotional support, encouraging the achievement of physical-rehabilitation goals, encouraging positive coping, and the personal sharing of practitioners own experiences and opinions.⁵⁰

Highlighting the value of social support, Canadian national team skiers reported that social support from coaches and rehabilitation practitioners was important in providing reassurance about getting better, keeping things in perspective, focusing on future opportunities and encouragement to adhere to the rehabilitation program.⁵¹ Similarly, U.S. alpine and freestyle skiers in Gould et al.'s (1997) study believed that their injury recovery was facilitated by coach interest and assistance.⁵² Johnston and Carroll (1998) also found that social support from a number of sources, including coaches and rehabilitation specialists, was beneficial in assisting athletes throughout the injury rehabilitation period.⁵³ Athletes reported that they needed various forms of social support from the coach and sport medicine practitioner (i.e., informational, emotional, and practical) at different points in the recovery period. For example, the need for emotional support was particularly important at the beginning of rehabilitation when athletes were trying to come to grips with the severity of their injury. At the end of rehabilitation, the need for informational support was most salient in ensuring that athletes did not return to sport prematurely. One athlete stated: "At this stage you are raring to go and just want to get back into playing your sport competitively, but you need someone to monitor your re-entry into sport and your training and to make sure you ease back into it and don't re-injure yourself" (p. 277).⁵³ Ironically, it was at this time that some athletes indicated a lack of sport-specific advice, encouragement, and feedback, especially from the physiotherapist and coach.^{53, 54} For example, athletes indicated that they perceived their coaches to be distant and insensitive to injury, did not provide sufficient or appropriate rehabilitation guidance, nor demonstrated a belief in them.⁵⁵ Similarly, athletes in a later investigation indicated a lack of (informational) support from coaches and physiotherapists as they were returning to play.⁵³ Athletes reported receiving insufficient advice, guidance and information from their coaches about how to train as they re-entered the competitive arena.⁵³ These findings are supported by more recent work⁵⁶ which reveals that NCAA Division II-III injured athletes were significantly more satisfied with social support provided by athletic trainers (ATCs) than that provided by coaches and teammates. In addition, injured athletes reported that social support provided by ATCs contributed significantly more to their overall well-being.

A lack of social support from relevant individuals such as coaches, contradicts substantial evidence of the benefits discussed earlier.⁴⁰ Social support from coaches, family members and medical practitioners may be essential in assisting athletes in dealing with the demands of injury recovery and complying with the rigors of their

rehabilitation regimen.⁵³ Coaches and sport medicine practitioners are encouraged to stay involved and to provide alternative activities (such as developing special practice routines) so athletes can achieve appropriate clinical outcomes and sport specific skills as they transition back into training and competition. This ongoing involvement diminishes feelings of isolation from the team, allows athletes to continue to develop in their sport, reduces feelings that athletes are falling behind, and helps maintain confidence in their capabilities when they are returning to their sport.⁵⁷

Performance concerns facing returning athletes

As the completion of rehabilitation draws near and the prospect of a return to sport approaches, a range of performance concerns may develop. The degree to which athletes experience apprehension regarding the return to sport may be a reflection of the success of the preceding rehabilitation.^{58, 59} Unfortunately, it is apparent that psychological recovery from injury does not inevitably ensue following medical clearance to return to sport.⁶⁰ A range of psychosocial issues have been documented during the return to sport transition including: anxieties associated with re-injury, concerns about achieving pre-injury levels of athletic proficiency, perceptions of being disconnected from relevant others (e.g., coaches, teammates), a lack of athletic identity, and insufficient social support.^{3, 27} External and internal pressures to return to sport may compound the challenges inherent in this transitional period and further test athletes' coping resources.⁶¹ Finally, athletes may experience self-presentational concerns about the prospect of *appearing* unfit, incompetent or lacking in skill.

Methods for assessing psychological readiness to return

Taking into account the psychological nature of rehabilitation as well as the plethora of demands confronting returning athletes, the need for evaluation of psychological readiness to return is imperative. A number of user-friendly assessments exist in the literature which can help guide return to sport decisions. These include: Creighton and colleagues' 3-step return-to-competition decision making model,⁶² the *Injury Psychological Readiness to Return to Sport Scale*,⁶³ and the Re-injury Anxiety Inventory.²⁷ Creighton and colleagues' 3-step return to competition decision making model is a useful heuristic for conceptualizing the various stages of athletes return to sport as well as key considerations for each step. In step 1 of the model, the health status of the athlete is assessed through the evaluation of medical factors (e.g., medical history of the patient, lab tests such as x-rays or MRIs, severity of the injury, functional ability, and psychological state). Step 2, involves consideration of the risks associated with participation by assessing variables such as the type of sport played (e.g., collision, non-contact), the

position played (e.g., goalie, forward), the competitive level (e.g., recreational, professional), the ability to protect (e.g., bracing, taping, padding), and the limb dominance of the patient. Step 3 in the decision-making process includes consideration of non-medical factors that can influence return-to-competition decisions. Relevant considerations here include the timing in the season (e.g., playoffs), pressure from the athlete or others (e.g., coach, athlete's family), ability to mask the injury (e.g., pain medications), conflict of interest (e.g., potential financial gain or loss to the patient or clinician), and fear of litigation (e.g., if participation is restricted or permitted). The model provides a framework outlining the complex interaction of factors ultimately contributing to return-to-competition decisions. Utilizing the 3 step process outlined (and the associated considerations of each step) can help guide practitioner decisions regarding athletes' return to play.

The *Psychological Readiness to Return to Sport Scale* (I-PPRS, 2009) consists of 6 items in which athletes are asked to rate dimensions of confidence on a scale from 0 – 100. Initial validation of the instrument suggests that it is a reliable and valid measure. Given its concise nature, the I-PPRS can be easily administered by health practitioners in the rehabilitation setting. The six items include: (1) "My overall confidence to play is...", (2) "My confidence to play without pain is...", (3) "My confidence to give 100% effort is...", (4) My confidence to not concentrate on the injury is..." (5) My confidence in the injured body part to handle the demands of the situation is ...", and finally, (6) My confidence in my skill level/ability is..."

The *Re-Injury Anxiety Inventory* is a 28-item measure of two factors: anxieties regarding rehabilitation (RIA-R: 15 items ; e.g., "I am worried about becoming re-injured during rehabilitation", "I feel nervous about becoming re-injured during rehabilitation) and upon re-entry into competitive sport (RIA-RE: 13 items, e.g., "I am worried about becoming re-injured during re-entry into competition", "I feel nervous about becoming re-injured during re-entry into competition"). Walker et al., (2010)²⁷ differentiate fear (a flight or fight response to danger) from anxiety (uncertainty, worry or concern) suggesting that anxiety more precisely captures the athletes state of mind. Reliability measures, as well as face, content and factorial validity provide strong preliminary evidence for the psychometric utility of this inventory, rendering it a useful tool in the identification of "at-risk" athletes.

Part 2 – Clinical Practices

Diagnosis & Triage

From an emotional or psychological standpoint, serious injury is one of the most traumatic things that can happen to an athlete. It can take away an athlete's career at any time. It threatens the feelings of invincibility and

*immortality that everybody who is young has to some degree. Because athletes are so dependent upon their physical skills and because their identities are so wrapped up in what they do, injury can be tremendously threatening to their self-identity. Geoff Petrie, NBA All Star & Vice President, Basketball Operations*⁶⁴

Injury is an emotionally disruptive experience for anyone, but perhaps more so for athletes, especially those for whom sport is central to lifestyle and personal identity. Consequently, distress is commonplace, even though a diagnosable psychological disorder is not typically seen. The two key psychological dynamics of distress are loss and threat, both of which are psychological drivers of the challenge of rehabilitation. Loss reflects change in lifestyle that is imposed by injury, that which the athlete used to do but cannot while recovering. Similarly, threat relates to the uncertainty of the future. Loss can potentially evolve into sub-clinical or full blown depression, while threat can evolve similarly into an anxiety disorder. With injury, recovery is not complete until the athlete is psychologically ready to return to play. Just as athletes must progress through a physical healing process, they must also address the psychological consequences of injury and the challenges of rehabilitation. Efforts to conceptualize the psychological recovery process for athletes began with adaptation of the work of Kubler-Ross' (1969) *On Death and Dying*.⁶⁵ This approach is groundbreaking in that it identifies distress not as pathology but as a normal consequence of an unfortunate situation; it has not however, withstood either empirical or clinical scrutiny. The research within the sport psychology has focused more on the prediction of rehabilitation outcomes (e.g., adherence) than on models for clinical intervention. Thus, Heil (1993)⁶⁴ proposed the Affective Cycle of Injury as a clinical model that is sensitive to the medically driven challenges of rehabilitation. It assumes that emotional reactions to injury are cyclical and vary based on daily experiences that create stress or inspiration. The "engine of emotion" that drives the psychology of rehabilitation has three components: (a) distress (e.g., loss and threat), (b) denial (unacknowledged distress); and (c) determined coping (vigorous, proactive, goal-driven behavior).

Distress reflects the effects of injury on emotional equilibrium. Denial may be functional when it enables athletes to maintain a positive focus, manage distressing thoughts or to protect themselves from being overwhelmed by negative emotions. Denial is harmful when, for example, failure to recognize the severity of an injury results in poor compliance to a rehabilitation regimen. Determined coping involves moving beyond a resigned sense of acceptance of injury and a passive sense of waiting for the injury to heal. It encompasses exploration including:

looking for possibilities, clarifying goals, seeking resources, exploring alternatives, learning new skills, and commitment, such as new focus, vision, teamwork, cooperation, and balance.⁶⁶

The affective cycle of injury assumes that emotional recovery is not a simple linear process, but a cycle, that varies over days and weeks, and even within the course of a day. It is useful to envision a macrocycle (which spans the recovery process), minicycles (which are linked to the medical stages of rehabilitation), and microcycles (which reflect the ups and downs of daily life). In the macrocycle of recovery, athletes generally move from distress and denial to determined coping. However, each distinct stage of rehabilitation constitutes a minicycle which presents new challenges. The microcycle recognizes shifts in emotional response among distress, denial, and determined coping that follow from living with injury. Even as one of the three components may predominate any given stage in rehabilitation, emotional responses will typically vary, so that even during periods of determined coping, episodes of denial or distress may appear. Thus, the affective cycle facilitates awareness of and sensitivity to the specific psychological challenges of rehabilitation, and how athletes are responding to these challenges.

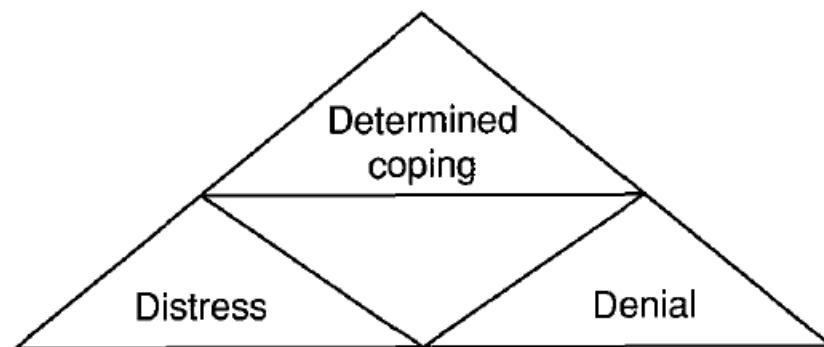


Figure 1. *The Affective Cycle of Injury.*

The Sport Medicine Injury Checklist (List 1 below) is a guide to triage of the injured athlete. The items are not weighted and vary in clinical significance. This checklist simply represents a comprehensive set of factors that offers insight into the psychological status of the athlete and serves as a starting point for triage, diagnosis and psychological referral, if needed. There are a variety of formal psychological assessment instruments that the psychologist may use in arriving at a diagnostic impression. For more information see Heil and Podlog (2012)⁶⁷ and Heil (1993, reprinted 2011).⁶⁴

1 List 1. *Sports Medicine Injury Checklist*⁶⁴

Sports Medicine Injury Checklist

Acute phase

- ☐ Failure of pain to respond to routine management strategies
- ☐ Failure of athlete to comply with recommended rehabilitation program
- ☐ Rehabilitation setbacks
- ☐ Emotional distress (depression, irritability, confusion, guilt, withdrawal)
- ☐ Irrational fear or anxiety in specific situations in the otherwise well-adjusted athlete (may be seen as avoidance of feared situation)
- ☐ Overly optimistic attitude toward injury and recovery
- ☐ Persistent fatigue
- ☐ Sleep problems
- ☐ Gross overestimate or underestimate of rehabilitation progress by athlete

Chronic phase

Current factors

- ☐ Persistence of pain beyond natural healing
- ☐ "Odd" descriptions of pain
- ☐ Inconsistency in "painful" behavior or reports of pain
- ☐ Failed attempt(s) at return to play
- ☐ Performance problems following return to play
- ☐ Inability to identify realistic goals for recovery
- ☐ Recent stressful changes in sport situation
- ☐ Stressful life circumstances (within the last year)
- ☐ Depression (including changes in sleep, appetite, energy, and libido)
- ☐ Strained relationships with coaches, teammates, or friends
- ☐ Personality conflicts between treatment providers and athlete
- ☐ Poor compliance with scheduled visits and medication use
- ☐ Additional medical treatment sought by athlete without consulting current treatment providers (including emergency room visits)
- ☐ Iatrogenic problems
- ☐ Repeated requests for pain (especially psychoactive) medication
- ☐ Evidence of illicit drug use (recreational or ergogenic)

History

- ☐ Multiple surgeries at pain site
- ☐ Chronic pain in the same or another physiological system (may be resolved)
- ☐ Family members with chronic pain
- ☐ Problematic psychosocial history (behavior problems in school; vocational, marital, or legal problems; history of physical or sexual abuse)
- ☐ Problematic psychological history (repeated or prolonged psychological adjustment problems; alcohol/drug problems; eating disorders)

2

3 **Treatment Intervention**

4 *The more I thought about it, the more cancer seemed like a race to me. Only the destination had changed. They*

5 *shared grueling physical aspects, as well as a dependence on time, and progress reports every interval, with*

checkpoints and a slavish reliance on numbers ...The idea was oddly restorative: winning my life back would be the biggest victory. Lance Armstrong, *World Class Tour Cyclist & Founder, Livestrong Foundation*.⁶⁸

A psychologically minded approach to the delivery of medical services is the first line of response to injury and rehabilitation. Facilitating optimal recovery includes both being attentive to psychological distress and coaching the athlete on the best path to recovery. Athletes possess a “physical intelligence” that enables them to be a more active agent in the rehabilitation process than the general medical patient. As a consequence, they are able to benefit from detailed information about the injury and treatments, and form specific goals and milestones for recovery. As illustrated in the quote above, reframing rehabilitation as an athletic challenge focuses athletes on their strengths and gives them the tools to take control of their rehabilitations. Engaging the athlete in this type of dialogue also builds trust and confidence in the medical provider which can facilitate adjustment to set-backs and to key transitions in the rehabilitation process, including return to play.

The use of medication in pain management, in particular, is controversial. For a review of concerns unique to the performing athlete see Heil and Podlog (2012).⁶⁷

A capsule summary of an intervention plan as might be conducted by a sport psychologist is provided below. The skill based focus that is unique to sport psychology highlights the expectation that psychological attributes can be cultivated just as physical function can be enhanced. A more in depth review of this plan is available directly from the authors.

1 List 2. *Injury Intervention Plan*

Skill 1: Injury Education – *Providing proactive practical information about injury, healing and rehabilitation will empower the athlete, cultivate a sense of personal investment in the recovery process and facilitate compliance with treatment tasks.*

Skill 2: Rehabilitation and Return to Sport Goals – *Understanding of rehabilitation goals will help athletes create a sense of personal responsibility and increase their expectations of return to sport by creating a clear path towards recovery.*

Skill 3: Building the Rehabilitation Team – *Building a team that helps meet the challenges and demands of the new rehabilitation environment will help the athlete overcome feelings of isolation related to separation from the sport/team, and build confidence in providers, recovery and return to sport.*

Skill 4: Managing Emotions – *Understanding how to identify and cope with the distress inherent in injury will help improve mood, and neurovegetative function and modulate the “ups and downs” of rehabilitation.*

Skill 5: Visualizing the Stages of Recovery – *Fostering confidence in athletes’ ability to cope with injury adversity and endure rehabilitation is driven by depicting a positive future perspective on the recovery process.*

Skill 6: Focus and Distraction Control – *Facilitating a task focus and providing guidance in distraction control can enable athletes to deal with the uncertainty of rehabilitation and remain appropriately focused on physical, technical, and psychological skills.*

Skill 7: Working Through Pain – *Managing pain effectively will enable the athlete to trust the rehabilitation process, maintain a stable emotional state, and make effective decisions regarding activity and limits.*

Skill 8: Building Confidence in Return to Play – *Accepting fear and treating it as a tool to guide decision making, while cultivating trust in rehabilitation, treatment providers and self will enable the athlete to transition effectively to sport.*

Skill 9: Mental Toughness and the Survival Mind Set – *Focusing on controlling the “controllables” – including personal thoughts, feelings, and actions – will enable the athlete to gain global skills in coping with adversity and facilitate remarkable recovery.*

Skill 10: Becoming a “Renewed Athlete” – *Assimilating lessons learned from injury and re-embracing the aspirations that lead to initial participation will enable the athlete to return to sport renewed and reinvigorated.*

Complications

There is an extensive array of psychological factors, positive and negative, that play into the recovery process for better or worse. Essentially, the psychology of the injured athlete is an “x” factor that influences both the speed of recovery and readiness for return to play, or alternatively the transition to a new lifestyle. Because pain and fear are common spoilers in the rehabilitation process, these will be discussed in detail. The role of psychological factors in remarkable recovery and as a model for guiding optimal recovery has also been addressed in the literature. Athletes who view the rehabilitation process as a competitive challenge and whose mindset propels them to new levels of athletic attainment following return to play are said to have achieved a remarkable recovery. For more information see Heil and Podlog (2012).⁶⁷

Pain

*After being injured, I couldn't figure out what pain is good and what is bad. I needed a lot more communication and explanation on the possible types of pains that I might experience. I look back and feel as though there were times where I could have kept training but stopped, and times when I needed to stop, but didn't. Each time it made me feel helpless and lose confidence in my ability in the sport. Iris Zimmermann, Olympic Fencer & Coach.*⁴⁸

Pain may emerge as a barrier to rehabilitation: as a potent distractor, as a trigger of anxiety or fear about recovery, or as a question about the efficacy of treatment. Conversely, failure to recognize and accept the limits that pain is signaling can also complicate recovery. Given the complexities of reporting and assessing pain there is the potential for compliance problems to become intertwined with the provider-patient relationship. Alternatively, failure to respond to pain as a signal of danger or otherwise set reasonable limits on physical activity may also complicate the recovery process. A failure to set limits can simply be indication of a naïve enthusiasm but may also reflect a complex set of underlying dynamics. This may be manifested as denial⁶⁹ or a counterphobic response⁷⁰ whereby athletes may push needlessly into pain as a signal of effort or proof of courage.

Pain management in both sport and rehabilitation shares a common skill set: 1) to effectively assess the meaning of pain perceptions; 2) to maintain an appropriate focus in the face of distractions (such as pain perception or catastrophizing cognition); 3) to engage in informed decision making regarding a best course of action, and; 4) to regulate the autonomic and other physiologic mechanisms of the pain system.

The pain-sport matrix⁶⁴ identifies a four-dimensional strategy, which addresses pain assessment, decision making, focusing, and self-regulation. It follows from extensive research with long-distance runners on the psychological strategies of association and dissociation as methods for managing the collective discomfort of pain, fatigue, and exertion during performance.^{67, 71-73} In this literature, association refers to a focus on relevant performance cues while dissociation implies a specific attempt to detach from the experience of pain.⁷⁴

The “pain-sport matrix” treats pain and performance as independent dimensions identifying four broad classes of pain coping methods, defined by whether the athlete “focuses on” or “focuses away from” pain and sport.^{67, 71} Figure 2 below provides a visual depiction of the “pain-sport matrix” while List 3 delineates the various types of attentional focus described by the matrix.

	Sport	Pain
Association		
Disassociation		

Figure 2. Pain-sport matrix

List 3. Types of attentional focus within the pain-sport matrix

1. *Associating to both pain and sport* can be beneficial when pain signals proper technique. If instead, the athlete changes movement patterns to avoid pain, compensatory injury could result.
2. *Dissociating from both pain and sport* during performance is problematic because focus is sacrificed for the sake of pain management. Alternately, this approach could be beneficially applied during natural breaks from activity as a way of getting psychological rest from pain or the cognitive demands of sport.
3. *Dissociating from pain while associating to sports performance* is appropriate when pain is understood as routine or benign; otherwise pain becomes a distraction and undermines performance.
4. *Associating to pain and dissociating from sport* is of value in the management of overuse and chronic injury. Because sport performance can fully absorb attention, pain signals may be suppressed to the detriment of athletes’ physical well-being. This strategy can be used in breaks between activities to assess pain, or for example, be used as a check on muscular guarding.

Fear

Your mind is racing ... you feel your heartbeat pounding in your chest. Your focus is on the heaviness of your breathing and the stream of negative thoughts running through your mind.... The image of you falling all the way to the bottom is foremost in your mind. Kathy Kreiner-Phillips, Olympic Alpine Gold Medalist and Sport Psychologist (p.114)⁶⁴

Fear and the risk of injury are integral in sport. As Kreiner-Phillips' comments indicate, fear can take over the moment. In high-risk sports (e.g., motor sports, alpine ski racing, X-Games events), the risk of injury and the fear of injury can increase in tandem. Fear is not, however, necessarily an unhealthy reaction as it can cause athletes to develop a respect for the potential dangers and ensure sensible action. At the same time, fear that consumes athletes actually puts them at greater risk of injury by creating muscle tension and bracing, tentativeness in execution, and distraction from essential focusing cues. Fear of injury (or reinjury) can range from a routine concern, to a subclinical syndrome, to a diagnosable disorder. The critical task is determining whether fear is benign and simply a distraction, or an indication of a potential threat. Another test is whether the fear is reasonable and grounded in objective reality or irrational and inappropriate.

The physiological and psychological elements of the fear response create a complex web of interacting influences. The figure below illustrates the ways in which fear can undermine performance and increase injury risk. Fear may elicit a complex set of interacting psychological and physiological changes. Awareness of autonomic changes or a decrease in concentration may cause athletes to become distracted from their rehabilitation exercises, triggering a downward spiral that results in poor rehabilitation. If fear of reinjury persists as athletes return to sport, they may experience hesitancy, avoidance, poor performance, or muscular guarding (i.e., bracing or splinting that either isolates or decreases the mobility of the injured body part) – all of which may increase the risk of reinjury. However, if athletes are engaged in a psychologically minded rehabilitation program that both provides detailed information regarding recovery and cultivates confidence, there is a commensurate decrease in fear as they test the formerly injured area in training.

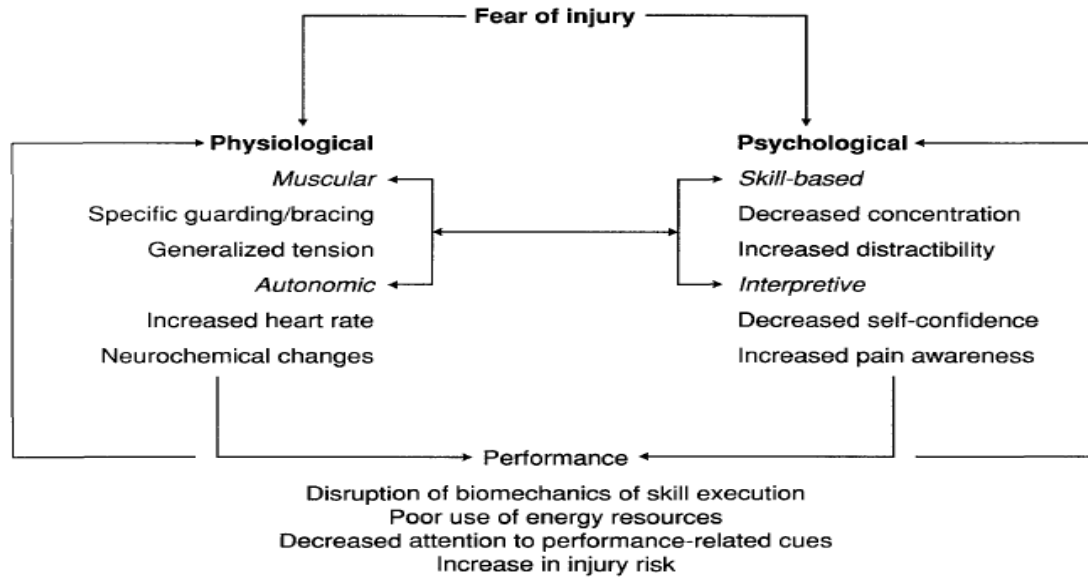


Figure 3. Fear of injury: A psychophysiological model of risk.

Summary

This review highlights the impact of injury on athletes' psyche. Examination of the research literature revealed the influence of athlete cognitions, emotions, and behaviors on injury rehabilitation processes, as well the impact of the patient-practitioner relationship and social support provisions. Specific performance concerns among returning athletes and tools/inventories for assessing psychological readiness to return to sport were described. The section on clinical practices highlighted the Affective Cycle of Injury as a model for clinical intervention and the Sports Medicine Injury Checklist as a practical guide for assessment and triage. A brief overview of the fundamentals of an injury intervention plan was provided, and the influence of pain and fear in the rehabilitation process was described. A comprehensive perspective of injury should encompass emotional and cognitive factors as well as physical, functional abilities. Ultimately, the sports medicine professional plays a critical role in psychological assessment and intervention especially where injury is severe or otherwise complicated.

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